

Littoral Crustacea from Southwest Florida

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IN recent years several studies have been conducted by the Institute of Marine Sciences, University of Miami, in estuary waters of Everglades National Park, Florida. The following annotated checklist of decapods, stomatopods, and isopods is one result of these studies.

Most of the animals were collected during a study of the freshwater requirements of animals in estuarine areas of Everglades National Park. Collections were made at stations from Chatham River in the Ten Thousand Islands to the upper Keys (Fig. 1).

Other collections were made in the course of a study of the ecology of the Everglades marshes. This was supported by the Bureau of Sport Fisheries and Wildlife. Plankton collections from Shark River and Buttonwood canal during research on pink shrimp (supported by the Bureau of Commercial Fisheries) provided additional material.

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REVIEW OF LITERATURE

Everglades Estuaries. Little systematic collecting of crustaceans has been done in the southwest Florida estuaries and near-shore habitats. In the late 1800's and early 1900's some collecting was done on the shallow shelf areas by the United States Fish Commission vessels *Fish Hawk*, *Albatross*, *Grampus* and the United States steamer *Bache*. At about the same time Henry Hemphill made a collection of crustaceans for the United States National Museum from the Marco Island area, a few miles north of Everglades National Park. The collections were described by Rathbun (1918, 1925, 1930, 1937) and Holthuis (1951, 1952).

Previous work on crustaceans from the area has been conducted at the University of Miami Institute of Marine Sciences by Tabb and Manning (1961), Tabb, Dubrow, and Jones (1962), Tabb and Jones (1962), Tabb, Dubrow, and Manning (1962), and Tabb and Manning (1962). Tabb and Manning (1961) produced a checklist

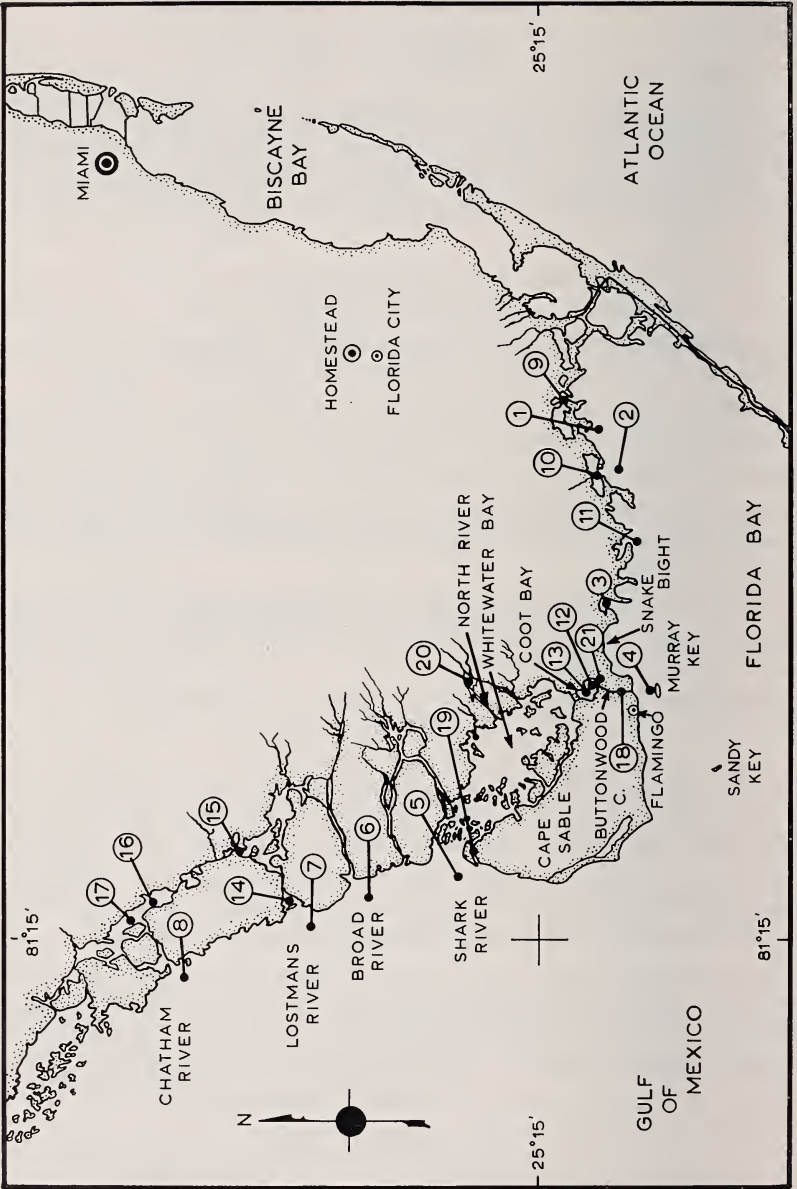


Fig. 1. Sampling stations in Everglades National Park, Florida

of the fauna of northwestern Florida Bay and the crustaceans reported there are included in the present list.

Dry Tortugas. Holthuis (1951, 1952) reported on the Palaemonidae of the Americas, including the Dry Tortugas area; several new species were described. Study of the Dry Tortugas Island crustaceans was undertaken by Pearse (1934a, 1934b, 1934c) while the Carnegie Institute of Washington Tortugas Laboratory was open.

Biscayne Bay. Voss and Voss (1955) and O'Gower and Wacasey (1967) collectively record 37 species of decapods, three isopods, and two stomatopods from the near-shore communities of Biscayne Bay.

North Carolina to Florida. In 1918 Hay and Shore published on the Decapoda of North Carolina. This work, although 46 years old in 1965, remained the best reference for identification of south Florida decapods until Williams (1965) published his excellent revision. The latter reference, based on Hay and Shore but supplemented by later collections, is the most complete taxonomic work available for decapods of the West Atlantic seaboard and is referred to extensively in the present checklist.

Gulf of Mexico. No complete list of Gulf of Mexico crustaceans has been produced. The following references include many of the animals found in Gulf of Mexico estuaries: Ives (1891), Yucatan, West Florida; Behre (1950), Grand Isle; Whitten *et al.* (1950), Texas; Hedgpeth (1950), Aransas National Wildlife Refuge; Gunter (1950), Texas; Pearse (1952), Texas; Hildebrand (1954), brown shrimp grounds; Wass (1955), Alligator Harbor, Florida; Hulings (1961), Panama City, Florida; Menzel, (1956), St. George's Sound-Appalachee Bay, Florida; Parker (1959), Laguna Madre, Texas; Leary (1961), Texas; Breuer (1962), Laguna Madre.

ZOOGEOGRAPHY

Many of the species from the coastal states of the eastern seaboard, the Gulf of Mexico, and the West Indies meet in south Florida waters. Species of the Carolinian fauna of Atlantic coast states are well represented. Williams (1965) lists 69 (68 per cent) of the Everglades 103 decapods as being found in the Carolinas. As would be expected, the more northerly Virginian Province shows less resemblance to our fauna. Wass (1963) lists 41 (32 per cent) local isopods, stomatopods, and decapods that have been recorded in Virginia.

Gulf of Mexico species are not as common in south Florida as the species from the Atlantic coast and the West Indies. About 35 per cent of the Everglades species have been reported as far west as Texas and less than two per cent are limited to the Gulf of Mexico.

The greatest affinities are with the West Indies fauna. Approximately 71 per cent of the Everglades species have been taken in the Caribbean, with about 43 per cent ranging on to South America.

METHODS OF COLLECTING AND STATION DESCRIPTIONS

At the main stations, numbered 1 to 8 (Tables 1, 2), quantitative collections were made with a two-meter otter trawl (modified shrimp try-net). At station 5, a flat triangular dredge (18 inches on each side) was used with the otter trawl. A modification of the van Veen bottom grab was employed at stations 9 to 17. Crustaceans taken in estuary outlets to the Gulf were collected in wing nets fishing 18 square feet, and in one meter plankton nets. These provided species which were moving up and down Buttonwood Canal (18) and Shark River (19). In the North River (20) and Coot Bay Pond (21), fyke nets and various plastic and wire traps were utilized.

CHECKLIST

The following list contains 129 species, including 24 isopods, two stomatopods, and 103 decapods. Tabb and Manning (1961), in their checklist of northwestern Florida Bay animals, list eight isopods, of which *Cymothoa caraibica* and *Sphaeroma destructor* were not taken during this study. Both studies produced the same two stomatopods. Nine of the decapods taken by Tabb and Manning (*Penaeus aztecus*, *Sicyonia dorsalis*, *Penaeopsis goodei*, *Synalpheus pectiniger*, *Panopeus americanus*, *Sesarma curacaoense*, *Eurytium limosum*, *Uca thayeri*, and *Uca rapax*) were not observed during the present investigation. Most of these crustaceans probably could be found with a more thorough habitat search, especially offshore plankton tows and shoreline collecting. Holes of burrowing mud shrimp were evident on some shorelines and were probably callianassid species. *Callianassa islagrande* Schmitt and *C. jamaicense louisianensis* are found farther north along the west coast of Florida (Wass, 1955) and *C. stimpsoni* has been reported from the Dry Tortugas (Pearse, 1934c).

TABLE 1
Physical characteristics of the stations

Method	Salinity (ppt)	Temperature (C)	Bottom type	Depth (ft)
1. Trawl	35.8 (8.9-52.4)	25.4 (16.5-30.5)	Mud	3.5
2. Trawl	38.4 (28.1-58.0)	24.4 (15.6-28.8)	Mud	2.3
3. Trawl	47.9 (26.5-66.0)	26.7 (17.8-32.2)	Soft marl mud	2.0
4. Trawl	38.2 (31.1-53.0)	24.3 (10.8-30.8)	Heavy marl mud	4.5
5. Trawl & dredge	34.7 (28.9-43.0)	24.3 (15.5-29.4)	Shell rubble	7.0
6. Trawl	33.9 (29.8-44.8)	24.3 (15.0-32.2)	Shell, marl sediment	5.0
7. Trawl	33.7 (24.3-37.8)	24.3 (15.0-31.5)	Shell, marl sediment	7.0
8. Trawl	31.7 (15.0-38.8)	24.1 (18.1-31.4)	Hard sediment	5.0
9. Grab	28.0 (5.1-50.8)	25.2 (17.1-30.2)	Marl over rock	2.0
10. Grab	32.7 (16.8-57.3)	25.9 (16.8-31.5)	Marl and Sediment	3.2
11. Grab	44.9 (37.2-55.5)	24.9 (15.5-30.8)	Marl over rock	2.5
12. Grab	32.1 (22.0-50.8)	25.2 (16.2-32.1)	Mud and shell	3.0
13. Grab	30.2 (21.9-50.0)	25.1 (15.6-30.6)	Marl and shell	4.0
14. Grab	27.0 (11.4-39.0)	23.6 (17.3-30.0)	Marl and shell	5.0
15. Grab	16.4 (0.0-36.6)	25.1 (18.3-30.2)	Organic sediment	3.0
16. Grab	22.4 (5.7-38.4)	24.9 (17.4-30.8)	Marl and shell	2.5
17. Grab	21.7 (0.0-38.3)	24.9 (18.2-31.0)	Shell and sediment	4.0
18. Nets	35.0 (16.0-50.0)	26.0 (17.0-31.0)	Hard marl	7.0
19. Nets	29.0 (23.5-42.2)	25.5 (17.1-31.8)	Rock with some peat	15.0
20. Nets & traps	15.3 (0.0-32.7)	25.5 (15.0-32.7)	Organic sediment	1.0
21. Traps	24.3 (0.0-44.3)	24.3 (13.7-35.5)	Mud	1.5

TABLE 2
Vegetation and comparative distinctions of the stations

Stations	Vegetation ¹	Remarks
1. Florida Bay	Sparse <i>Thalassia</i> (AY), Red algae (S)	Heavy freshwater runoff
2. Florida Bay	Sparse <i>Thalassia</i> (AY), Red algae (S)	No daily tide. Sponges common
3. Florida Bay	Abundant (AY), Algae (S), <i>Diplanthera</i> (W)	No daily tide. High salinity
4. Murray Key Flat	Abundant <i>Thalassia</i> (AY), <i>Cymodocea</i> (S)	Daily tide. Few sponges
5. Shark River Delta	Sporadic periods of dead vegetation (AY)	Gorgonians and sponges common
6. Broad River Delta	Sparse algae (S)	Sponges common
7. Lostmans River Delta	Algae (S)	Sporadic sponge catches
8. Chatham River Delta	Abundant algae (S)	Sponges abundant
9. Florida Bay	<i>Diplanthera</i> (S, W), <i>Ruppia</i> (W)	Strong hydrogen sulfide
10. Florida Bay	Dead <i>Thalassia</i> (S), Sparse live <i>Thalassia</i> (W)	Open bay water
11. Florida Bay	<i>Thalassia</i> (S), <i>Diplanthera</i> , <i>Ruppia</i> (W)	Dead <i>Thalassia</i> all year
12. Coot Bay	<i>Ruppia</i> (S, W), <i>Diplanthera</i> (W)	Some tidal effect
13. Coot Bay	<i>Ruppia</i> (S), <i>Chara</i> (W)	Some tidal effect
14. Lostmans River	Almost none (AY)	Heavy tidal effect
15. Lostmans River	None (AY)	Strong hydrogen sulfide. No tide
16. Lostmans River	None (AY)	Hydrogen sulfide. Slight tide
17. Lostmans River	Algae, <i>Cracillaria</i> (S), Sparse <i>Ruppia</i> (W)	Hydrogen sulfide. Slight tide
18. Buttonwood Canal	Floating <i>Thalassia</i> (S)	Heavy tide. Large manmade canal
19. Shark River	None (AY)	Very heavy tide
20. North River	Marsh grass (AY), Bladderwort (S)	Grassy marsh off main river
21. Coot Bay Pond	None (AY)	Small manmade culvert

¹Letters in parenthesis indicate all year (AY), summer (S), winter (W).

Spaeroma destructor is the only species known to have vanished from the area in which it was common in the winter of 1957-58. The 11 species found by Tabb and Manning (1961) but not collected during this study, are included in the checklist, with the environmental data taken in that study.

The references given with each species include a diagnostic description or some other pertinent information. The stations are described in Tables 1 and 2. Station numbers in italics are the locations where more than 100 individuals were collected. Comments on abundance are given in parenthesis after the station numbers as follows: rare, less than 10 specimens collected; uncommon, from 10 to 25 specimens. The salinity and temperature figures designate the upper and lower limit of the observed range. Figures and months in parentheses indicate the range and time of year of the most prevalent occurrence; e.g. salinity range 23 (33-39) 53 ppt, Ovigerous all year (winter).

Order ISOPODA

Family Anthuridae

Cyathura polita (Stimpson). Miller and Burbanck, 1961; Menzies and Frankenberg, 1966: 35. Stations 16, 17 (uncommon). Salinity 20-36 ppt. Temperature 24-28C. Although *C. polita* was not common at regular collecting stations, it was taken in numbers on the intertidal mud banks just east of Flamingo about 15-20 yards from the shore line (Stromberg, personal communication).

Family Cirolanidae

Cirolana parva Hansen. Richardson, 1905: 111; Menzies and Frankenberg, 1966: 51; Miller, 1968: 15. Stations 1, 2, 5, 6, 8. Salinity 9-52 ppt. Temperature 18-34C.

Family Exocorallanidae

Exocorallana tricornis (Hansen). Richardson, 1905: 139. Stations 1, 2, 5, 6, 7, 8. Salinity 23-25 ppt. Temperature 16-30C. The males of this isopod have three prominent tubercles on the dorsal surface of the head. About one fourth of those caught were males.

Exocorallana sexticornis (Richardson). Richardson, 1905: 143. Two specimens were collected in eastern Florida Bay.

Family Aegidae

Rocinela signata Schioedte and Meinert. Richardson, 1905: 209. Stations 1, 2, 4, 5, 9, 18 (uncommon). Salinity 31-58 ppt. Temperature 18-29C.

Family Cymothoidae

Aegathoa oculata (Say). Richardson, 1905: 217. Stations 2, 4, 6, 7, 8, 20 (uncommon). Salinity 24-50 ppt. Temperature 18-32C.

Nerocila acuminata Schioedte and Meinert. Richardson, 1905: 220. One specimen was found in a brackish water pond near Coot Bay.

Cymothoa excisa Perty. Richardson, 1905: 248; Menzies and Franken-

berg, 1966; 30. Stations 1, 4, 5, 6, 7, 8. Salinity 15-53 ppt. Temperature 18(20-26)32C. Occurred as a parasite in the mouth of the pigfish, *Orthopristis chrysopterus*, with infestation up to 90 per cent in December and less than five per cent during the summer months.

Cymothoa caraibica Bovallius. Richardson, 1905: 252. Salinity 35 ppt. Tabb and Manning (1961) recorded this species near Sandy Key off Cape Sable, but it was not collected during the present study.

Lironeca ovalis (Say). Richardson, 1905: 263. Stations 7, 21 (rare). Salinity 30-33 ppt. Temperature 24-31C. The spelling given by Monod (1931) was used in place of the apparent mis-spelling (i.e., *Livoneca*) used by many authors.

Family Sphaeromidae

Cassidinidea lunifrons (Richardson). Richardson, 1905: 273, ix. Station 20. Salinity 9 ppt. Hansen (1905) produced a paper on Sphaeromidae with several generic names taking preference over those given by Richardson (i.e., *Cassidisca* = *Cassidinidea*).

Sphaeroma destructor Richardson. Richardson, 1905: 282; Menzies and Frankenberg, 1966: 47. Salinity 7(25-39)41 ppt. Tabb and Manning (1961) noted this isopod as being very abundant during the fall and winter of 1957 and 1958 in the Coot Bay area, but as rare from 1958 to 1961. None were collected during the present study.

Cymodoce faxoni (Richardson). Menzies and Miller, 1955. Stations 1, 2, 3, 4, 6, 7, 8, 18, 19. Salinity 9(45-58)61 ppt. Temperature 16-32C. This isopod is especially abundant in eastern Florida Bay, but seems to be replaced by *Paracerceis caudata* along the western edge of Florida Bay. It was not observed by Tabb and Manning (1961). Approximately 25 per cent of the specimens collected were males.

Paracerceis caudata (Say). Richardson, 1905: 314; Menzies and Frankenberg, 1966: 46-47; Miller, 1968: 13. Stations 1, 2, 3, 4, 5, 6, 7, 8. Salinity 15(32-42) 53 ppt. Temperature 12-32C. The second most abundant species collected. A total of 11,258 specimens were taken at the 8 stations listed above; 10,458 of these came from station 4 (Murray Key) in western Florida Bay. Males constituted 18 per cent of the number taken at station 4 and 22 per cent of those collected at station 8 (Chatham River delta). As with *Cassidinidea* above, Hansen's name preempts *Cilicæa* Richardson.

Family Idotheidae

Edotea montosa (Stimpson). Richardson, 1905: 397; Menzies and Frankenberg, 1966: 22. Station 19. Found in bottom tows with detritus.

Cleantis planicauda Benedict. Richardson, 1905: 404; Menzies and Frankenberg, 1966: 23. Stations 1, 2, 4, 7, 8. Salinity 9-58 ppt. Temperature 12-32C.

Erichsonella floridana Benedict. Richardson, 1905: 403. Stations 1, 2, 3, 4, 5, 6, 7, 8, 18, 19. Salinity 9(31-52)61 ppt. Temperatures 16-32C. The identification of this species is tentative since a series of specimens ranging from the descriptions of *E. attenuata* through *E. filiformis* to *E. floridana* were taken from a single sample collected at station 18 (Buttonwood Canal). Some

specimens fit none of the descriptions given by Richardson, being longer than *E. attenuata*, but having no ornamentation.

Family Bopyridae

Metaphrixus carolii Nierstrasz and Brender á Brandis. Nierstrasz and Brender á Brandis, 1931: 206. Abdominal parasite on the two species of *Thor*.

Probopyrus alpheii Richardson. Richardson, 1905: 559. One specimen found on *Alpheus* sp.

Probopyrus latreuticola (Gissler). Richardson, 1905: 560. One specimen was found on *Thor* sp.

Bopyrina abbreviata Richardson. Richardson, 1905: 563. This parasite has been found in this study only on *Hippolyte pleuracantha*. Richardson (1905) stated that *B. abbreviata* was found only on *H. zostericola* which has been confused in the literature with *H. pleuracantha* (Williams, 1965).

Bopyrina urocaridis Richardson. Richardson, 1905: 565. The host for this parasite was the small shrimp, *Periclimenes longicaudatus*.

Family Ligidae

Ligia baudiniana (H. Milne-Edwards). Richardson, 1905: 678; Van Name, 1936: 58. Samples from Biscayne Bay and Florida Bay at Flamingo were examined by Dr. George Schultz (personal communication) of Duke University Marine Laboratory. He commented as follows: "Apparently somewhere south of Biscayne Bay there is a transition zone between *Ligia exotica*, which is found north to at least Beaufort, North Carolina, and *Ligia baudiniana* which is found south to at least Panama".

Ligia exotica (Roux). Richardson, 1905: 676; Van Name, 1936: 48. Of the populations observed along northern Florida Bay, *L. baudiniana* was established on the shore line in areas having salinity of 35 ppt or higher while *L. exotica* was found on into the brackish water habitat of the marsh and inner-bay shores.

Order STOMATOPODA

Family Squillidae

Squilla prasinolineata Dana. Manning, 1959; 1963. Stations 4, 5, 7 (rare). Salinity 31-37 ppt. Temperature 22-24C.

Squilla empusa Say. Manning, 1959; 1963. Stations 5, 6, 7, 8, 18, 19. Salinity 24-35 ppt. Temperature 22-30C.

Order DECAPODA

Family Penaeidae

Penaeus duorarum Burkenroad. Voss, 1955; Williams, 1965: 21. Stations 1, 2, 3, 4, 5, 6, 7, 8, 18, 19, 20, 21. Salinity 0(28-50)/66 ppt. Temperature 11-34C. The pink shrimp are found during all months of the year. Carapace lengths ranged from 3 to 41 mm; most specimens were juveniles.

Penaeus aztecus Ives. Voss, 1955; Holthuis, 1959: 63; Williams, 1965: 24. Tabb and Manning (1961) reported this species as not abundant, and it was not taken during the present study.

Penaeopsis goodiei (Smith). Verrill, 1922: 44; Voss, 1955; Williams, 1965: 29. Plankton samples taken in the Gulf of Mexico yielded this small shrimp (Tabb and Manning, 1961), but it was not found in the present study.

Trachypeneus constrictus (Stimpson). Verrill, 1922: 45; Voss, 1955; Williams, 1965: 31. Stations 2, 4, 5, 6, 7, 8, 18, 19. Salinity 15(29-37)45 ppt. Temperature 16-30C. Adults were collected in shrimp sampling nets at Shark River (station 19) and Buttonwood Canal (station 18) in July and August. Larvae (Pearson, 1939) were found during the entire year in Shark River samples.

Trachypeneus similis (Smith). Voss, 1955. Station 5 (rare).

Sicyonia dorsalis Kingsley. Verrill, 1922: 49. Not taken during this study, but found by Tabb and Manning (1961).

Sicyonia laevigata Stimpson. Williams, 1965: 33. Station 7 (rare). Salinity 34 ppt. Temperature 20C.

Sicyonia typica (Boeck). Voss, 1955; Williams, 1965: 36. Stations 4, 5, 7, 19. Salinity 31-34 ppt. Temperature 16-24C. Most abundant in shrimp nets fishing the Shark River (station 19) during the summer and fall. They were collected only on the ebbing tides.

Sicyonia brevisrostris Stimpson. Williams, 1965: 35. Station 8 (rare). Salinity 24 ppt. Temperature 24C. Although the adults were rarely taken, the larvae and juveniles (Cook and Murphy, 1965) were collected in a plankton tow just inside the mouth of Chatham River in August of 1965.

Family Sergestidae

Lucifer faxoni Borradaile. Verrill, 1922: 53; Williams, 1965: 40. Stations 18, 19.

Family Pasiphaeidae

Leptochela serratorbita Bate. Williams, 1965: 41. Station 5 (rare).

Family Palaemonidae

Leander paulensis Ortmann. Manning, 1961. Stations 1, 2, 3, 4, 5, 6, 7, 8, 18, 19. Ovigerous during the spring and summer. Salinity 24(33-36)53 ppt. Temperature 12-34C. After being synonymized with *Leander tenuicornis* (Say) by Holthuis (1952), *Leander paulensis* was redescribed by Manning (1961).

Leander tenuicornis (Say). Holthuis, 1952: 155; Williams, 1965: 55. Usually observed only on drifting *Sargassum* weed offshore while *L. paulensis* was most abundant from red algae, *Gracillaria* sp., in estuaries.

Palaemon floridanus Chace. Holthuis, 1952: 197. Stations 3, 4, 7. Ovigerous in the spring. Salinity 31(32-40)52 ppt. Temperature 12-32C. This shrimp, reported only from the west coast of Florida, can be recognized by the long up-swept rostrum with 7 to 9 dorsal rostral teeth and 2 to 3 sub-apical teeth. The ventral edge of the rostrum bears from 5 to 9 teeth.

Palaemonetes paludosus Gibbes. Holthuis, 1952: 207. Station 20. Ovigerous in the fall and winter (October). Salinity 0-8 ppt. Temperature 18-32C. When this species was abundant (October-December), many of the individuals carried an unidentified branchial parasite. Larval development has been reported by Dobkin (1963).

Palaemonetes intermedius Holthuis. Holthuis, 1952: 241; Williams, 1965: 58. Stations 3, 4, 7, 8, 20, 21. Ovigerous during September (January-February) April. Salinity 0(10-11) (43-64)66 ppt. Temperature 15-34C. Of the three species of *Palaemonetes* found during these studies, *P. intermedius* was

found in the highest salinities. In the North River (station 20), as salinities decreased, *P. intermedius* stayed in the 10-30 ppt range, overlapping *P. pugio* which in turn overlapped *P. paludosus*. Rarely were all three taken at a station on the same trip. The optimal salinity of *P. intermedius* could not be determined and may be related to changes in the habitat during rainy and dry seasons. Those from station 3 (Florida Bay) were found most frequently in the 43-64 ppt range during drought, while those from station 20 (North River) were more often taken in the 10-11 ppt range following drought-breaking rains.

Palaemonetes pugio Holthuis. Holthuis, 1952: 244; Williams, 1965: 59. Stations 20, 21. Ovigerous all year. Salinity 0(10-15)43 ppt. Temperature 15-32C. Not taken as commonly as the other two species of *Palaemonetes*. It was collected most frequently in the salinities intermediate between those occupied by *P. paludosus* and *P. intermedius*. Broad (1957) has reported rearing *P. pugio* in the laboratory.

Periclimenes longicaudatus (Stimpson). Holthuis, 1951: 26; Williams, 1965: 42. Stations 1, 2, 3, 4, 5, 6, 7, 8, 18, 19. Ovigerous females were taken from September (February-March) April, but were uncommon even during these months. Salinity 15(24-43)55 ppt. Temperature 12(16-28)34C. Except for *Tozeuma carolinense*, this species was the most common caridean taken.

Periclimenes magnus Holthuis. Holthuis, 1951: 52. Salinity 38 ppt. Temperature 28C. One specimen of this extremely rare species was found at station 4 (Murray Key) in April 1965. It was deposited in the United States National Museum. The only other specimen known from the literature was collected in the Gulf of Mexico off Aransas, Texas (Holthuis, 1951).

Periclimenes americanus (Kingsley). Holthuis, 1951: 60; Williams, 1965: 43. Stations 1, 3, 4, 5, 6, 7, 8. Ovigerous all year (March-April). Salinity 15(29-40)61 ppt. Temperature 12-34C. Body smaller and broader than *P. longicaudatus*.

Family Alpheidae

Alpheus sp. Stations 1, 2, 3, 4, 5, 6, 7, 8, 18, 19. One ovigerous female was taken in September. Salinity 24-53 ppt. Temperature 12-32C. This is the species that has been called *Alpheus heterochaelis* Say in south Florida. Upon detailed examination by several workers, it is believed to be a separate species from those found in North Carolina. Larvae of specimens taken from widely separated areas (Key West, Bahamas, and North Carolina) show distinctly different development (Brooks and Herrick, 1892; Verrill, 1922; Dobkin, personal communication). *A. armillatus* was found in this study to be restricted to the Gulf stations while *Alpheus* sp. was about equally distributed over the eight main trawl stations.

Alpheus armillatus H. Milne-Edwards. Verrill, 1922: 76; Williams, 1965: 67. Stations 5, 6, 7, 8 (uncommon). Ovigerous females were found in most months of the year. Salinity 23-45 ppt. Temperature 20-30C. *A. armillatus* is readily distinguished from *Alpheus* sp. by the flat triangular base of the rostrum. Armstrong (1949) described a closely related species, *A. viridari*, from Dominican Republic that has also been found on the Dry Tortugas grass banks. Small chelae ratios (length/height) of these three related species are: *A. armil-*

latus, 3.6 (range 3.0-4.4); *Alpheus* sp., 4.4 (range 3.9-5.2); and *A. viridari*, 5.3 (range 5.0-6.2).

Alpheus normanni Kingsley. Williams, 1965: 65. Stations 1, 3, 5, 6, 7, 8. Ovigerous in the winter months. Salinity 24-43 ppt. Temperature 16-30C. This small snapping shrimp has a ridge ending in a tooth on the outer margin of the large chela. In formalin preserved specimens a reticulated red color pattern with several black dots on the abdomen distinguishes *A. normanni* from young *Alpheus* sp. and *A. armillatus*. In the literature *A. normanni* has been called *Alpheus packardii* Kingsley.

Synalpheus apioceros Coutiere. Coutiere, 1909: 27. Station 5, 6, 7, 8. Ovigerous in the winter months (rare). Salinity 23-45 ppt. Temperature 20-34C. *S. apioceros* and *S. townsendi* differ very little in appearance. The basic diagnostic characteristic is that the basicerite of *S. apioceros* is armed with a superior spine nearly equal to the frontal teeth while the spine of *S. townsendi* is at most a blunt angle.

Synalpheus townsendi Coutiere. Coutiere, 1909: 32; Williams, 1965: 72. Stations 5, 7, 8 (rare). Ovigerous in December (one specimen). Salinity 30-37 ppt. Temperature 20-26C. Coutiere named an "oxyceros" form, *S. townsendi productus*, which many of our specimens resemble. They are differentiated only by an elongation of the rostrum, frontal teeth, and lateral spine of the scaphocerite. Specimens were often taken in the sponge *Ircinia strobilina* as well as free-living.

Synalpheus hemphilli Coutiere. Coutiere, 1909: 38; Verrill, 1922: 94. Stations 5, 8 (rare). Ovigerous in December-January (rare). Salinity 33-35 ppt. Temperature 24-26C. The remainder of the alpheids were found associated with sponges, and with the exception of *S. herricki* generally not more than one or two per sponge. Adult *S. hemphilli* are about half again larger than the two preceding species. They were the only species of Coutiere's Neomeris group collected, although *S. fritzmuelleri* has been reported from Marco Island.

Synalpheus minus (Say). Coutiere, 1909: 43; Williams, 1965: 70. Stations 5, 6, 7, 8. Ovigerous in February-March (rare). Salinity 31-37 ppt. Temperature 24-26C. The distal part of the palm and finger are a dark red color.

Synalpheus brevicarpus (Herrick). Coutiere, 1909: 50; Verrill, 1922: 110. Stations 4, 5, 6, 7, 8 (uncommon). Ovigerous females were found during most months of the year. Salinity 31-40 ppt. Temperature 24-34C. Adults average more than twice as large as *S. minus*.

Synalpheus herricki Coutiere. Coutiere, 1909: 74. Stations 5, 6, 8. Ovigerous in the winter (February). Salinity 32-35 ppt. Temperature 22-24C. Identifying the *Synalpheus* species is difficult, particularly in the Laevimanus group. Some closely related species in this group from South Florida are *S. brooksi*, *S. tanneri*, *S. herricki*, and *S. pectiniger*. *S. brooksi* was noted as being abundant in loggerhead sponges in Biscayne Bay (Dobkin, 1965), around the Dry Tortugas (Pearse, 1934a), and in the same habitat at Bimini (Pearse, 1950). Wass (1955) found *S. pectiniger* in a yellow sponge in the Alligator Harbor area. During the present study *S. herricki* was taken in colonies from loggerhead sponges. Most of the specimens were of Coutiere's typical form, but a few approached the *S. herricki dimidiatus* variety.

Synalpheus pectiniger Coutiere. Coutiere, 1909: 78. Salinity 33 ppt. One specimen was collected by Tabb and Manning (1961), but it was not taken in the present investigation.

Family Ogyrididae

Ogyrides yaquiensis Armstrong. Armstrong, 1949. Stations 5, 7, 14, 18, 19. Ovigerous in the winter (rare). Salinity 14-35 ppt. Temperature 20-24C. This peculiar little shrimp was commonly intercepted in plankton tows from Shark River (station 19) and Buttonwood Canal (station 18). Ratios of the segments of the legs compare closely with Armstrong's type: subdivided carpus of second pair—proximal 1.00, second 0.29, third 0.38, and the chela 0.76; five distal segments of the third leg—ischium 1.00, merus 0.76, carpus 0.71, propodus 0.47, dactylus 0.32. The number of spiniform teeth on the rostral carina were found to be a direct function of size and ranged from 4 to 13 teeth.

Family Hippolytidae

Hippolyte pleuracantha (Stimpson). Williams, 1965: 80. Stations 1, 2, 3, 4, 6, 7, 8. Ovigerous all year (spring). Salinity 9(32-50)61 ppt. Temperature 12(26-32)34C. Holthuis (in Williams, 1965) has pointed out the differences between *H. pleuracantha* and *H. zostericola* (Smith) which have been confused in the literature. Approximately three fourths of those collected were ovigerous females.

Thor sp. (I). Stations 1, 2, 3, 4, 5, 6. Ovigerous all year. Salinity 9(38-52)61 ppt. Temperature 12-32C. At the present time, this species is distinguished from *Thor* sp. (II) only by the size of the eggs. In formalin-preserved specimens the average size of *Thor* sp. (I) eggs was 1.01 mm (range 0.89-1.09) and *Thor* sp. (II) 0.60 (range 0.56-0.66). During this study no attempt was made to differentiate between the adult nonovigerous specimens. One of these species appears to be *Thor floridanus* Kingsley (Verrill, 1922: 135; Williams, 1965: 76), but Dr. Sheldon Dobkin of Florida Atlantic University has examined Kingsley's type and found no ovigerous females, thus making a separation using this distinction impossible. *Thor* sp. (I) was common in the higher salinity stations of Florida Bay while *Thor* sp. (II) was found in lesser numbers at the Gulf of Mexico stations. There was an overlapping at Murray Key (station 4) with about one eighth as many *Thor* sp. (II) taken as *Thor* sp. (I).

Thor sp. (II). Stations 2, 3, 4, 5, 6, 7, 8. Ovigerous all year. Salinity 15(33-40)61 ppt. Temperature 12-34C.

Latreutes fucorum (Fabricius). Verrill, 1922: 131; Williams, 1965: 78. Stations 4, 5, 6, 7, 8. Ovigerous from November to March. Salinity 24(32-36)53 ppt. Temperature 12-32C. Found in the *Sargassum* complex usually, but taken in this study also on *Thalassia* beds.

Latreutes parvulus (Stimpson). Holthuis, 1947: 59; Williams, 1965: 79. Stations 4, 5, 6, 7, 8. Ovigerous all year (winter). Salinity 15(23-39)50 ppt. Temperature 16-34C. This small *Sargassum* shrimp has been referred to in the literature as *Rhynchocyclus parvulus* Stimpson, *Concordia gibberosus* Kingsley, (Hay and Shore, 1918), and *Latreutes gibberosus* (Kingsley), (Schmitt, 1935) until the correct name was applied by Holthuis (1947). Ovigerous females made up 60 per cent of the total caught at station 8 (Chatham River).

Tozeuma carolinense Kingsley. Verrill, 1922: 127; Williams, 1965: 83. Stations 1, 2, 3, 4, 5, 6, 7, 8, 18, 19, 21. Ovigerous all year. Salinity 23(33-39)53 ppt. Temperature 11(16-32)34C. The most common crustacean collected (28,516 total; 27,289 from station 4). Of those collected at station 4, 46 per cent were ovigerous. The generic name for this species was formerly *Angasia* (Holthuis, 1947).

Hippolysmata wurdemanni (Gibbes). Williams, 1965: 84. Stations 4, 5, 6, 7, 8. Ovigerous in the winter (February). Salinity 23-45 ppt. Temperature 20-34C. A prominent hair-spine between each of the dorsal rostral teeth helps to identify this beautiful small shrimp.

Family Processidae

Processa sp. Holthuis, 1959: 120; Williams, 1965: 86. Stations 5, 7, 8 (uncommon). Salinity 23-39 ppt. Temperature 19-29C. Two species were collected. The first appears in many respects to be the same as Gurney's (1936) *P. bermudensis* (Rankin). It has no antennal spine. The carpus of the right leg has 19-28 segments and the merus has 9-13; left leg carpus 14, merus 4. Gurney stated that his specimens had 18 distinct segments on the carpus of the right leg and 17 on the left, but his figure indicates 25 and 18 which agrees more closely with our specimens. The second species, represented by only one ovigerous female, has an antennal spine and much smaller second legs (right carpus 9 segments, merus 5; left carpus 10, merus 4). The ventro-distal angle of the sixth somite ends in a distinct tooth. The spination of the legs varies in both species.

Family Astacidae

Procambarus alleni Faxon. Hobbs, 1942. Station 20, 21. Common on the flooded freshwater glades during the rainy season.

Family Palinuridae

Panulirus argus (Latreille). Williams, 1965: 91. Stations 1, 4 (rare). No ovigerous females taken. Salinity 36-42 ppt. Temperature 22-24C.

Family Scyllaridae

Scyllarus americanus (Smith). Williams, 1965: 96. Stations 5, 7 (rare). Salinity 24-32 ppt. Temperature 23-24C.

Family Callinassidae

Upogebia affinis (Say). Schmitt, 1935: 196; Williams, 1965: 103. Stations 18, 19. Ovigerous females were taken in most months of the year. Young of this species were common during the winter months on the flood tide at Shark River (station 19).

Family Porcellanidae

Euceramus praelongus Stimpson. Haig, 1956: 7; Williams, 1965: 109. Stations 5, 6 (uncommon). No ovigerous females taken. Salinity 29-39 ppt. Temperature 16-29C. Rearing of the larvae has been reported by Morris (1968).

Petrolisthes armatus Gibbes. Haig, 1956: 19. Stations 1, 2, 3, 4, 5, 6, 7, 8. Ovigerous all year (autumn). Salinity 15(29-37)47 ppt. Temperature 16-34C. *P. armatus* is a smaller crab than *P. galathinus* and has a more varied, drab coloration.

Petrolisthes galathinus (Bosc). Haig, 1956: 22; Williams, 1965: 107. Stations 5, 6, 7, 8. Ovigerous in October (rare). Salinity 29(30-35)36 ppt. Temperature 20-30C. Generally taken when sponges (principally *Haliclona rubens*) are washed in from offshore. Diagnostic characteristics of *P. galathinus* are four teeth or lobes on the carpus while that of *P. armatus* is armed with three spine-tipped teeth. *P. galathinus* was observed more commonly in deeper water than at our collecting stations.

Polyonyx gibbesi Haig. Haig, 1956: 28; Williams, 1965: 113. Station 6 (rare). No ovigerous females taken. Four free-living individuals were found, all on the Broad River delta (station 6) in March 1965. One other specimen was taken in *Chaetopterus variopedatus* in February 1965. This species has been called *P. macrocheles* (Gibbes) in the literature. Early larval stages have been reared in the laboratory by Gore (1968).

Porcellana sayana (Leach). Haig, 1956: 31; Williams, 1965: 110. Station 5 (rare). No ovigerous females taken. Salinity 33 ppt. Temperature 24C.

Megalobrachium soriatum (Say). Haig, 1956: 35; Williams, 1965: 112. Stations 5, 6, 7, 8. Ovigerous all year. Salinity 24-45 ppt. Temperature 19-30C. Haig (1960) discusses the *Porcellanopsis* and *Megalobrachium* electing to combine all species of these two genera under *Megalobrachium*.

Family Diogenidae

Petrochirus diogenes (Linnaeus). Holthuis, 1959: 151; Williams, 1965: 122. Stations 5, 6, 7, 8 (uncommon). No ovigerous females taken. Salinity 31-37 ppt. Temperature 20-32C. The largest hermit crab taken from this area. In the literature this species has been called *Petrochirus bahamensis* (Herbst), (Provenzano, 1959; Wass, 1955).

Paguristes hummi Wass. Wass, 1955: 148; Provenzano, 1959: 381. Stations 4, 5, 6. Ovigerous in October and November. Salinity 28(29-31)43 ppt. Temperature 15(19)30. This interesting hermit crab, reported south of Marco Island for the first time, was taken as far south as Murray Key (station 4). It is easily recognized by the brilliant blue, yellow, and black patch on the inner surface of the merus of the cheliped. This species has also been reported from Galveston, Texas (Leary, 1961), and is known from the east coast of Florida (Provenzano, personal communication).

Paguristes torgugae Schmitt. Holthuis, 1959: 131; Provenzano, 1959: 388; Williams, 1965: 119. Stations 1, 2, 5, 6. Ovigerous in May (rare). Salinity 9-50. Temperature 15-32C. A black band across the eyestalks and antennules facilitates identification.

Family Paguridae

Pagurus longicarpus Say. Provenzano, 1959: 394; Williams, 1965: 125. Stations 5, 6, 7, 8 (uncommon). No ovigerous females taken. Salinity 15-34 ppt. Temperature 20-30C. The distribution of this pagurid, like several others, seems to be disjunct at the Florida peninsula with specimens from the Atlantic and Gulf of Mexico distinguishable. All were found in *Polinices* shells.

Pagurus impressus (Benedict). Provenzano, 1959: 399; Williams, 1965: 129. Stations 5, 6 (rare).

Pagurus pollicaris Say. Provenzano, 1959: 401; Williams, 1965: 128.

Stations 5, 6, 7, 8. No ovigerous females taken. Provenzano (1959) suggests that the Gulf of Mexico population is subspecifically distinct.

Pagurus bonairensis Schmitt. Stations 1, 2, 3, 4, 5, 6, 7, 8, 18, 19. Ovigerous in December-February. Salinity 9(29-52)/66 ppt. Temperature 12(28-30)/34C. The following is a personal communication from Dr Anthony Provenzano of the University of Miami Institute of Marine Sciences: This species was erroneously identified by Provenzano (1959) as *Pagurus annulipes* Stimpson. *P. annulipes* is a more northern form, distributed from Woods Hole south along the Atlantic coast to at least northern Florida and to depths of some meters, and along the Gulf of Mexico shores from Texas to at least Cedar Key on the northwest coast of Florida. *P. annulipes* can be distinguished from *P. bonairensis* by its much shorter antennae bearing setae at least 4-5 segments long; setae on the antenna of *P. bonairensis* are only 1-2 segments long. *P. bonairensis* is distributed from the northern Gulf of Mexico, where it overlaps the range of *P. annulipes*, south through the Caribbean region. Its southern most limit is not known with certainty. It is very likely that all records of "*P. annulipes*" from shallow tropical waters of the Western Atlantic are based on specimens of *P. bonairensis*, although there is a possibility that there exists still another *Pagurus* with which *P. bonairensis* may be confused. Certainly *P. annulipes* Stimpson does not extend into warm waters south of Florida. The type of *P. annulipes* was apparently lost, but recently two specimens identified as this species by Stimpson and donated to the British Museum by the Smithsonian Institution have been discovered. They are not the species illustrated by Provenzano, (1959) from south Florida waters. *P. bonairensis* is about the same size as *Paguristes hummi*, but *P. hummi* is associated with shell beds and *Pagurus bonairensis* with grass flats.

Family Dromiidae

Hypoconcha arcuata Stimpson. Rathbun, 1937: 47; Williams, 1965: 144. Station 5 (uncommon). No ovigerous females taken. Salinity 29-43 ppt. Temperature 19-30C. This peculiar crab attaches to the concave side of a lamelli-branch mollusc shell. In this study they were only found occupying *Trachycardium muricatum* and *T. egmontianum* valves.

Family Leucosiidae

Ebalia cariosa (Stimpson). Rathbun, 1937: 125; Williams, 1965: 147. Stations 5, 6, 7. No ovigerous females taken. Salinity 29-43 ppt. Temperature 16-30C. Common on the shell rubble of Shark River (station 5).

Persephona aquilonaris Rathbun. Williams, 1965: 150. Stations 5, 6, 7, 8 (uncommon). Ovigerous in February (rare). Salinity 24-37 ppt. Temperature 16-27C. Guinot-Dumortier (1959) separates *P. aquilonaris* and *P. punctata* (Linnaeus) recognized as a subspecies by Rathbun (1937: 154).

Family Calappidae

Calappa flammaea (Herbst). Rathbun, 1937: 198; Holthuis, 1958; Williams, 1965: 152. Stations 5, 6, 7 (rare). No ovigerous females taken. Salinity 34-37 ppt. Temperature 16-28C.

Hepatus epheliticus (Linnaeus). Rathbun, 1937: 238; Williams, 1965: 158. Stations 7, 8 (rare). One ovigerous specimen taken in January. Salinity 15-34

ppt. Temperature 20-28C. Larval development has been reported by Costlow and Bookhout (1962).

Family Portunidae

Portunus sayi (Gibbes). Rathbun, 1930: 37; Williams, 1965: 163. In the summer months of 1965, *Sargassum* plants were flourishing in Whitewater Bay during a period when salinities ranged between 30 and 40 ppt. This seaweed carried much of the same fauna as in open ocean waters including *P. sayi*.

Portunus gibbesii (Stimpson). Rathbun, 1930: 49; Williams, 1965: 164. Stations 5, 6, 7, 8, 19. No ovigerous females taken. Salinity 15-39 ppt. Temperature 16-32C. The most often taken portunid in the area. Identification is facilitated by a naked iridescent spot near each posterolateral border. These crabs migrate in large numbers during the summer months. In June, 1966, through one ebbing nocturnal tide cycle, 1366 specimens (684 males, 682 females) were caught in wing nets at station 19 (Shark River). Mode size was: males, 28 mm and females, 26 mm carapace breadth (range 11 to 46).

Portunus spinimanus Latreille. Rathbun, 1930: 62; Williams, 1965: 165. Station 19 (uncommon). No ovigerous females taken. Sizes ranged from 14 to 45 mm carapace breadth.

Portunus depressifrons (Stimpson). Rathbun, 1930: 84; Williams, 1965: 166. Stations 8, 19 (rare). No ovigerous females taken.

Callinectes sapidus Rathbun. Rathbun, 1930: 99; Williams, 1965: 198. Stations 1, 2, 3, 4, 5, 6, 7, 18, 19, 20, 21. Ovigerous females mixed throughout the year (uncommon). Salinity 0-55 ppt. Temperature 16-31C. This portunid is fairly evenly distributed in Park estuaries. Sizes ranged from 30 to 147 mm in the areas with generally marine salinities and up to 209 mm in the upper reaches of rivers dominated by freshwater.

Callinectes ornatus Ordway. Rathbun, 1930: 114; Williams, 1965: 172. Stations 1, 2, 3, 4, 7, 8, 18, 19, 21. No ovigerous females taken. Salinity 24-50 ppt. Temperature 18-30C. Following Williams (1966), these crabs closely parallel the characters given for *C. ornatus*. Only a rare individual was taken as far inland as Coot Bay Pond.

Family Xanthidae

Panopeus herbstii H. Milne-Edwards. Rathbun, 1930: 335; Williams, 1965: 196. Stations 1, 5, 7 (uncommon). No ovigerous females taken. Salinity 32-35 ppt. Temperature 22-26C. Found occasionally on living oyster beds. Laboratory rearing of *P. herbstii* has been reported by Costlow and Bookhout (1961a).

Panopeus occidentalis Saussure. Rathbun, 1930: 348; Williams, 1965: 198. Stations 1, 2, 4, 5, 6, 7, 8, 20. Ovigerous in the winter months (uncommon). Salinity 15-45 ppt. Temperature 16-32C.

Panopeus americanus Saussure. Rathbun, 1930: 357. Salinity 12-25 ppt. Listed by Tabb and Manning (1961), but not observed in this study.

Neopanope texana texana (Stimpson). Rathbun, 1930: 367; Williams, 1965: 190. Stations 1, 2, 4, 5, 6, 7, 8. Ovigerous in December-February (uncommon). Salinity 28-52 ppt. Temperature 16-30C. Rathbun notes the gradations of individuals ranging from *N. texana texana* to *N. texana sayi* along the east coast of Florida. This situation exists in the Park waters also. The confusion

extends to a lesser degree to *N. packardii*. The only reliable diagnostic feature is the basal tooth on the fixed finger which is always present in *N. packardii* and absent (or slightly swollen) in *N. texana*. The chela coloration varies, both in shading and spreading.

Neopanope packardii (Kingsley). Rathbun, 1930: 380. Stations 1, 2, 4, 5, 6, 7, 8. Ovigerous all year (winter). Salinity 9(24-52)58 ppt. Temperature 16(20)32C. The most abundant xanthid found at the collecting stations. Most of the xanthids taken were small, either young or possibly stunted adults. Only a few individuals, even ovigerous females, reached the sizes given by Rathbun (1930). This was particularly true with *N. packardii*. The early life cycle stages have been reported by Costlow and Bookhout (1967).

Hexapanopeus angustifrons (Benedict and Rathbun). Rathbun, 1930: 384; Williams, 1965: 188. Stations 1, 2, 4, 5, 6, 7, 8. Ovigerous females were mixed throughout the year (February-July). Salinity 9(29-39)53 ppt. Temperature 16(28)34C. Larval development has been worked on by Chamberlain (1961) and Costlow and Bookhout (1966).

Eurypanopeus depressus (Smith). Rathbun, 1930: 410; Williams, 1965: 195. Stations 1, 2. No ovigerous females taken. Salinity 31-52 ppt. Temperature 22-24C. Common on old shell beds inhabiting the gaping valves of dead oysters. *E. depressus* has been reared in the laboratory by Costlow and Bookhout (1961b).

Eurytium limosum (Say). Rathbun, 1930: 423; Williams, 1965: 199. Generally found in muddy marsh banks (Ryan, 1956) and they were not examined during this survey. Tabb and Manning (1961) reported them from the "... marl and organic muds above the low tide line."

Rhithropanopeus harrisi (Gould). Rathbun, 1930: 456; Williams, 1965: 187. Stations 5, 6, 7, 14, 20. Salinity 2(8-20)40 ppt. Temperature 17-30C. Taken commonly in the rivers from decaying detritus.

Menippe mercenaria (Say). Rathbun, 1930: 472; Williams, 1965: 183. Stations 4, 5, 6, 7, 8. No ovigerous females taken. Salinity 15(27-35)45 ppt. Temperature 16-32C. Tabb and Manning (1961, 1962) found this species common in Florida Bay west of Snake Bight to Cape Sable. Only one specimen was collected that far south (station 4, Murray Key) in the present study; the remainder of them were taken at the open Gulf of Mexico stations with the largest number (195) collected at station 8 (Chatham River). The majority were juveniles ranging in size from 6.9 to 27.1 mm with an average carapace breadth of 10.9 mm.

Pilumnus sayi Rathbun. Rathbun, 1930: 484; Williams, 1965: 177. Stations 5, 6, 7, 8. Ovigerous in October and January (rare). Salinity 15-45 ppt. Temperature 16-34C. Three *Pilumnus* species were found associated with the sponge fauna of which *P. sayi* is the largest with females measuring up to 24 mm and males to 32 mm. Small *P. sayi* can be distinguished from *P. dasypodus* and *P. lacteus* by the dark brown spines of the chelae and dorsal spines on the hepatic region of the carapace. Chamberlain (1961) has reported rearing the larvae of *P. sayi*.

Pilumnus dasypodus Kingsley. Rathbun, 1930: 493; Williams, 1965: 178. Stations 5, 6, 7, 8. Ovigerous in December-May. Salinity 23-38 ppt. Tem-

perature 20-30C. This small species has brown spines on the chelae and no hair on the posterior one half of the carapace.

Pilumnus lacteus Stimpson. Rathbun, 1930: 511; Williams, 1965: 180. Stations 1, 4, 5, 6, 7, 8. Oviparous all year. Salinity 15(23-38)45 ppt. Temperature 16-34C. The most common of the three pilumnids. This species appears to be found with tunicates and bryozoans as well as sponges. Small black under-hairs cover the anterior one third of the carapace; no spines are present on the chelae.

Family Goneplacidae

Euryplax nitida Stimpson. Rathbun, 1918: 34; Williams, 1965: 202. Stations 5, 7, 8 (uncommon). One oviparous specimen found in January. Salinity 24-34 ppt. Temperature 16-26C.

Eucratopsis crassimanus (Dana). Rathbun, 1918: 52. Stations 5, 6, 7, 8 (uncommon). Oviparous in January-February (rare). Salinity 34-37 ppt. Temperature 22-29C.

Family Pinnotheridae

Pinnotheres maculatus Say. Rathbun, 1918: 74; Williams, 1965: 206. Stations 6, 18 (rare). No oviparous females taken.

Pinnixa sayana Stimpson. Rathbun, 1918: 156; Williams, 1965: 212. Station 6 (rare). No oviparous females taken. Salinity 33 ppt. Temperature 32C.

Family Grapsidae

Sesarma reticulatum (Say). Rathbun, 1918: 290; Williams, 1965: 221. No specific stations were included which would yield fiddler crabs. Therefore, only an occasional shoreline crab was collected, generally from around the mouth of Lostmans River.

Sesarma curacaoense de Man. Rathbun, 1918: 293; Holthuis, 1959: 242. Taken by Tabb and Manning (1961) on mangroves in western Whitewater Bay, but not collected during the present study.

Sesarma ricordi H. Milne-Edwards. Rathbun, 1918: 308; Holthuis, 1959: 246. Found on the brackish water mangrove river banks.

Aratus pisonii (H. Milne-Edwards). Rathbun, 1918: 323; Holthuis, 1959: 241. Generally this species was found along the shoreline in the mangrove complex throughout the Park, but in the spring months they were sporadically caught in the Shark River (station 19) plankton samples.

Family Ocypodidae

Uca rapax (Smith). Holthuis, 1959: 266. Not taken in the present study, but collected by Tabb and Manning (1961) burrowing in hard marl.

Uca pugilator (Bosc). Rathbun, 1918: 400; Williams, 1965: 232. *Uca pugilator* was taken only on the mud beaches of the open Gulf of Mexico while *U. speciosa* was found in the same habitat on the hard marl islands of Florida Bay and the upper river bays.

Uca speciosa (Ives). Rathbun, 1918: 408.

Uca thayeri Rathbun. Rathbun, 1918: 406; Holthuis, 1959: 275. Not collected during this study, but reported by Tabb and Manning (1961) from the black mangrove belt or rich, peaty soil.

Family Majidae

Metoporphaphis calcarata (Say). Rathbun, 1925: 21; Williams, 1965: 243. Stations 4, 5, 6, 7, 8, 19. No ovigerous females taken. Salinity 15(23-33)45 ppt. Temperature 12-34C. The Majidae are found in abundance only at the open Gulf of Mexico stations. No spider crabs were taken east of station 4 (Murray Key) and were uncommon at Murray Key.

Podocheila riisei Stimpson. Rathbun, 1925: 33; Williams, 1965: 241. Stations 4, 5, 6, 7, 8 (uncommon). No ovigerous females were taken. Salinity 20-45 ppt. Temperature 20-30C.

Pelia mutica (Gibbes). Rathbun, 1925: 278; Williams, 1965: 250. Stations 4, 5, 6, 7, 8. Ovigerous females were taken during most months of the year. Salinity 15(29-36)52 ppt. Temperature 16-32C. A small species, adult males ranged to 10.5 mm (carapace length to end of horns) with females to 6.7 mm.

Libinia dubia H. Milne-Edwards. Rathbun, 1925: 313; Williams, 1965: 252. Stations 4, 5, 6, 7, 8. One ovigerous specimen was taken in June. Salinity 30-52 ppt. Temperature 12-32C. *L. dubia* and *L. erinacea* are not readily distinguishable. It has been suggested that a spine on the proximal dorsal surface of the merus of *L. dubia* and absent in *L. erinacea* can be used as a diagnostic character. During this study specimens were found with no spine, ranging through a small tubercle to a large tubercle, a tooth, and a spine. The above physical data incorporates both species.

Libinia erinacea (A. Milne-Edwards). Rathbun, 1925: 321. The larval development stages have been reported by Yang (1967).

Pitho anisodon (von Martens). Rathbun, 1925: 368. Stations 4, 5, 6, 7, 8 (uncommon). One ovigerous female was taken in July. Salinity 30-38 ppt. Temperature 22-32C.

Macrocoeloma camptocerum (Stimpson). Rathbun, 1925: 469; Williams, 1965: 264. Stations 4, 5, 6, 7, 8 (uncommon). No ovigerous females taken. Salinity 30-52 ppt. Temperature 20-30C. The encrusting animals on the dorsal surface of the carapace often were as large a mass as the crab itself. Species of sponge included in this mass were *Dysidea* sp., *Haliclona* sp., and *Lissodendoryx isodictyalis* (Carter) as well as an unidentified ascidian.

Microphrys bicornutus (Latreille). Rathbun, 1925: 489; Williams, 1965: 259. Station 5 (rare).

Family Parthenopidae

Parthenope serrata (H. Milne Edwards). Rathbun, 1925: 516; Williams, 1965: 267. Station 5 (rare). Salinity 29-39 ppt. Temperature 18-29C.

Heterocrypta granulata (Gibbes). Rathbun, 1925: 555; Williams, 1965: 270. Stations 5, 8. No ovigerous females taken. Salinity 29-37 ppt. Temperature 16-30C. Commonly taken in the shell rubble at Shark River.

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